

THE "CLYDE CARDS": AN ACCOUNT OF BIOLOGICAL RECORDING IN THE WEST OF SCOTLAND

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INTRODUCTION AND OVERVIEW

The occasion of the meeting of the British Association for the Advancement of Science (BAAS) in Glasgow in 1901 gave rise to unprecedented activity in collating existing records and carrying out systematic surveys of the fauna and flora of the area. The previous meeting in Glasgow, in 1876, had highlighted the need for collation of species lists, which were published in a small book published in commemoration of the meeting (BAAS, 1876).

The activity continued after 1876, and when, around 1898, a further meeting of the British Association in Glasgow was announced, it was felt to be an opportunity 'for repairing many of the errors and omissions of the former Handbook, and for bringing to focus the very large amount of work which has been done of late years'. These data were collated and augmented by the efforts of the then active naturalists and published in a second, much larger, Handbook (BAAS, 1901).

The momentum of this activity apparently continued in the early years of the 20th century and, with the prospect of a further BA meeting in Glasgow, in 1928, the records were organised into a card index – the 'Clyde Cards' – rather than produce yet another handbook, which would apparently have been prohibitively expensive.

Though the level of activity had been inevitably diminished by the war-years and the subsequent years of depression, and though the naturalists of 1870-1914 – which now seems something of a 'golden age' – were succeeded by others of no less distinction, who continued to update the lists, it was not to be until the latter part of the century that comparable effort was to be put into systematic biological surveying and collation of records.

However, this more recent activity has been generated by a variety of needs, in contrast to the single focus of a meeting of the British Association. The dawn of a new millennium is undoubtedly one factor – witnessed by the number of 'Atlas 2000' projects implemented for several taxonomic groups. And the political demand for 'Biodiversity Action Plans' has highlighted the role of – and in many areas, the need for – local record centres, which have consequently been responsible

for increased activity in surveying and collating biological records. In the Greater Glasgow area, the Changing Flora of Glasgow project of 1986-2000 (Dickson, J.H. *et al.*, 2000) has been another notable focus of activity.

The middle years of the 20th century were not, of course, devoid of recording in the field, nor of reviews of the current species lists for individual taxonomic groups. Many examples of these can be seen in the pages of *The Glasgow Naturalist* and the *Annals of Scottish Natural History*. However, there does not seem to have been any focus such as the 1901 meeting of the British Association, nor do they necessarily cover the 'Clyde Area' – many concern themselves with individual localities (such as Possil Loch), vice-counties, or are national lists (Scotland, British Isles).

The present review concerns mainly a description of the early lists (1876 - 1928), those responsible for the work, and how it was organised, which brings in associated topics, such as the definitions of the 'Clyde Area', and the vice-county system. Developments in subsequent years will be outlined. Finally it discusses and contrasts the present approach to biological recording in the West of Scotland, with particular reference to the City of Glasgow – chosen as a contrasting case study using the most complete body of records readily available to the author.

THE CLYDE AREA

In the context of the three BAAS Handbooks, the term 'Clyde Area' has been used in a number of ways, sometimes in an explicitly vague sense, though various definitions have been proposed.

One of the earliest definitions is that of Buchanan White (1872) who included, as one of the 'natural divisions' of Scotland, 'The Clyde Area' comprising the counties of Ayr, Dunbarton, Renfrew and Lanark, West Stirling (draining to the Clyde), the Loch Lomond catchment area, parts of Argyll (Cowal, Knapdale, Kintyre, upper Loch Fyne), and the Clyde Islands (Arran, Bute, Cumbrae, Ailsa Craig, and various smaller islands).

Buchanan White's definition would have been available to the compilers of the 1876 list, though it is not apparently used by them. Indeed, the Handbook is entitled *Flora and Fauna of the West of Scotland* – and it will be seen that each of the

sections covers a slightly different area, from 'Glasgow and Vicinity' to areas extending in one case to North Uist, and in another, to the Solway coast.

The 1901 Handbook does claim to cover the Clyde Area, and contains a map with the boundary of the area covered and defines several rectangular regions bounded by lines of latitude and longitude, following a system suggested by Clark (1892). Although these rectangles extend further, the records themselves are apparently confined to Buchanan White's Clyde Area.

Patton, in the 1928 Handbook states that his account covers the same area as that chosen for the 1901 handbook, and defines the area as 'the drainage area of the River and Firth of Clyde'.

It is worth noting at this point that the Ordnance Survey's 'national grid' system of dividing up the country into metric squares was not proposed until the late 1930s and did not appear on maps until ten years later.

THE WATSONIAN VICE-COUNTIES

An earlier scheme for dividing up the British Isles for the purposes of biological recording was proposed by the botanist H.C. Watson (1852). This was the system of 'vice-counties': areas which related to the county boundaries as they existed at that date. The larger counties were subdivided – Perthshire contains three vice-counties – and the smaller counties grouped together or included in a larger grouping. There is an interesting example of this simplification strategy in the West of Scotland: the area around Kirkintilloch and Cumbernauld was at that time an 'enclave' of Dunbartonshire, an island surrounded by Stirlingshire; this area was included in the Watsonian vice-county of Stirling. The idea was to create a stable system of boundaries that would be independent of changes in administrative boundaries – and indeed one or two subsequent attempts to modify the VC boundaries on 'rational' grounds have failed for the very reason that the system's stability would be thereby violated.

The vice-county system is still used to this day. In addition to its stability, it has other major advantages: boundaries often correspond to some identifiable feature of the topography such as a stream or a path – though the original feature may now be lost; and most people have an understanding of where counties are in relation to each other, and may have a feeling of loyalty to their own area. Many national organisations such as the Botanical Society of the British Isles (BSBI), and the Mammal Society still have their vice-county recorders. However other organisations define different areas: The Clyde Bird Report confines its attention to Clydesdale and Loch Lomond, and Butterfly Conservation's SW Scotland area includes Dumfries and Galloway, all of Stirling District (as defined in 1996), and

extends NW to Mull, Coll, and Tiree.

Dandy (1969) argues for the vice-county system, making the point that 'a large proportion of records cannot be translated into any other system because precise localisation within the vice-counties was not given'. Thirty years or more later, we can only regret that he did not continue by recommending that the additional information should be made available.

Prior to the 1876 lists recording was customarily done on a parish basis. It was just after this time that recording by vice-county was adopted, whereby individual vice county recorders would have surveyed and collated records for their own vice-county. The Clyde Area, insofar as it includes several entire vice-counties, would embrace all these records, though as the subdivisions of the area do not correspond to VC boundaries, the compilers would have had to work from the original records.

THE 1876 HANDBOOK

At a meeting of the Natural History Society of Glasgow on April 25th 1876 a committee consisting of P. Cameron (Convener), D. Robertson, T. Chapman, J. Ramsay, J. Murdoch and J. Stirton was set up 'to consider whether it is advisable to have catalogues prepared of the Fauna and Flora of Clydesdale district, and if so, to endeavour to get competent naturalists to compile such, to consider the best way of getting those published, and to prepare a report on the Botany and Zoology of Clydesdale specifying more particularly those branches which still require to be worked out'.

The stimulus was apparently a letter from the Glasgow Society of Field Naturalists suggesting that a joint committee be set up for the purpose of preparing catalogues for the forthcoming meeting of the British Association. The idea of a joint committee apparently did not find favour with the members of the Natural History Society, though they did offer to identify specimens for the Field Naturalists.

In view of the short timescale (some 4 months), it seems reasonable to assume that the lists published in the 1876 Handbook are largely derived from pre-existing records.

The 1876 handbook is in two parts. Part I is entitled *Notes on the Flora and Fauna of the West of Scotland*, and contains five accounts, the titles of which indicate differences in the areas covered.

On the Mammalia of the West of Scotland **Edward R Alston**

Among the Mammalia it is interesting to note (from the perspective of the year 2001) that many species seemed to be on the increase. The red squirrel, now virtually unknown in the area, was actively recolonising Scotland and was widely regarded as vermin on account of the damage it

could do to coniferous trees - the first red squirrel in the Loch Lomond area was seen (and killed) in 1830. The grey squirrel, of course, was yet to be introduced to the west of Scotland (in 1892).

The hedgehog and the mole had begun to move north into the highland parts of the area, and the Scottish wild cat had recently become extinct in the Loch Lomond area, which also appeared to be becoming the last stronghold of the badger and the 'yellow-throated marten'. The latter, was referred to as *Martes abietum* - the pine marten, now known as *Martes martes* - and there was controversy as to whether the 'white-throated marten' also seen in the Clyde area was the beech marten *Martes foina* found in continental Europe. Current opinion is that *M. foina* has never been shown to be present in Britain. The rabbit was increasing in numbers and range, and the blue hare, previously confined to the north of the area, was moving south.

The porpoise had been seen in the Clyde 'up as far as Glasgow in the old days when the water was still pure'. The water vole, which is currently seen to be under threat, was then 'abundant'.

On the birds of Glasgow and its vicinity

Robert Gray

Robert Gray was, of course, a founder-member of the Natural History Society of Glasgow. The account is concerned only with Glasgow and its vicinity - as is the list in Part II. He remarks on the persistence shown by birds such as the plover and dunlin, in returning to the few isolated patches of suitable habitat in the Glasgow area that remained - in contrast to the expanses of marsh, mudflat and moorland that their predecessors would have known. He also remarks upon the change of nesting habit of the whitethroat which, though accustomed to nesting in the base of hedgerows, in the urban environment nests much higher above the ground. One of the more startling features of reports about birds from that period, is the frequent references to specimens obtained by shooting. And Gray refers to the eggs of a golden eagle being displayed, unblown, in a class-room of the University at a meeting of the Natural History Society 'with the remark that the eyrie had been robbed but a few hours previously within sight of the great tower'.

The account concludes as it began by noting further species that were stubbornly refusing 'to be scared by the inroads made upon their haunts' and suggesting that the list would 'prove not a less curious record in after-years when all traces of such bird-nurseries have been swept away'. He seems to have been unduly pessimistic; the species he singles out - magpie, dipper, kingfisher, plover, dunlin, greenshank, bittern, redshank, lapwing, and water-rail - are all still to be seen today in the vicinity of Glasgow, though some may be only occasional visitors.

On the insects of Clydesdale

Peter Cameron

The area reviewed here is 'the country drained by the Clyde'. In spite of the undoubted entomological richness of such a large and diverse area, and the zeal of various entomologists over many years, the effort had apparently been 'mainly directed to the Lepidoptera and the Coleoptera' and 'almost wholly confined to the lowland portions of the country'. For Coleoptera, Cameron singles out Possil Marsh, the Tollcross sand-pits, the N Ayrshire coast, Cadzow Forest, Cadder Wilderness and Ben Lomond. In Lepidoptera there were 33 species of butterflies and several moths which were rare, if not in Britain, then in Scotland.

The list of Hymenoptera was thought to be more or less complete - perhaps exceptionally rich in ichneumon wasps and chalcid wasps, along with the Trichoptera (caddis-flies). But the Diptera (flies) and Hemiptera (bugs) were almost wholly neglected.

On the vascular flora of the West of Scotland

James Ramsay

Here the area is extended south to include Wigtonshire and the Stewartry of Kircudbright, and north to Skye, though there appear to be few species noted in the list (in Part II) originating from these extensions. The relative paucity of species in the west compared with the south east of Scotland is noted with some bafflement, though a number of localities are singled out as of particular interest: Possil Marsh ('in which every Glasgow botanist may be said to have been baptized'), the sandy coast of Ayr, Ben Lomond, Ben Vorlich, Arran - particularly Goat Fell, and the ruined walls of Bothwell Castle, Blantyre Priory and Craignethan Castle.

Notable species singled out are: arrow-head (*Sagittaria sagittifolia*) found at Inchinnan and unknown in Hooker's *Flora Scotica* of 1821; a whitebeam ('*Pyrus aria* var. *fennica*' = *Sorbus pseudofennica*) found on Arran; bird's-nest orchid (*Neottia nidus-avis*) found in 'a few locations in Lanarkshire'; toothwort (*Lathraea squamaria*) on the north bank of the Clyde above Glasgow; and cat-mint (*Nepeta cataria*) on the walls of Craignethan Castle.

The near-disappearance of various fern species is noted with regret. Of the sea spleenwort (*Asplenium marinum*) to be found on Cumbrae: 'the fern-cultivating mania has made sad havoc of it of late'.

On the cryptogamic Botany of the West of Scotland, J Sturton

Again the area discussed extends beyond the Clyde Area, this time as far north as Ben Nevis and north-west to the Outer Hebrides. The area is seen as peculiarly favourable to the growth and development of the moisture-loving species of

which this grouping is largely comprised. The richness of the moss flora (*Campylopus* spp, *Dicrania* spp., *Dicranodontium* spp.) around Ben Vorlich is noted, along with a similar hot-spot for *Grimmia* spp. at Dumbarton Rock – and the similarity of the moss population there to that of other similar basaltic trap-rocks in the Kilpatrick Hills and beyond.

A number of ‘anomalies’ are highlighted; such as *Orthodontium gracile*, which was known from only 3 locations in England and one in Abyssinia, and was found in 1862 at Lennoxton Woods. The 1862 specimen still exists and has recently been re-verified. The species has also been seen at other locations in the west of Scotland.

Stirton makes a point which I will return to later in this review: *Dichymodon recurvifolius* had been reported on the slopes of Ben Lawers by A. McKinlay, one of the notable local botanists of the mid-19th century and whose speciality was mosses. This was the only known remaining location for this species, but Stirton had searched for it in vain, and he laments ‘the death of the discoverer precludes the possibility of any more definite information as to the exact place of growth’.

Liverworts highlighted are ‘the magnificent *Physotium cochleariforme*’ and *Adelanthus carringtonii*, on both Ben Vorlich and Ben Lawers. It is noted that the poor air quality within about 10 miles of Glasgow precludes the growth of lichens except on older trees in ‘certain inclosures and secluded glens’. The lichen *Piliporon fibula* previously known in N. America was found on Ben Vorlich in 1871, and was found subsequently on neighbouring mountains.

Species lists

Part II is entitled *The Flora and Fauna of Clydesdale and the West of Scotland* and consists of the species lists, grouped taxonomically by order and family. The work of several notable naturalists is acknowledged in a preface, among whom are: Roger Hennedy (who died later that year) for the greater part of the list of vascular plants and for a contribution to the list of marine algae; Peter Cameron jun. for the saw-flies and gall-flies; Thomas King for the list of mammals, and Richard McKay for the flowering plants and ferns.

As well as the scientific names of the species, common names are listed where available, with locations and an indication of frequency – common, frequent or rare.

In addition to the lists supporting the reviews in Part I, there are lists of reptiles, amphibia, land and fresh-water molluscs, and marine groups: crustacea, molluscs, coelenterates, algae, and diatoms.

THE 1901 HANDBOOK

It is not clear whether the committee set up in

1876 continued after the publication of the 1876 Handbook. It was apparently not functioning by 1893, when a Research Committee was set up with the aims:

- To further through the work of the Society, the investigation of the Flora and Fauna of the West of Scotland, and in particular, those departments of Invertebrate Zoology and Cryptogamic Botany regarding which no local information has yet been provided
- To aid Members and Associates by giving information regarding the Flora and Fauna of the district, and, as far as possible, by identifying Zoological and Botanical specimens.
- To compile Lists of the local Fauna and Flora

The Committee was chaired by Prof. Thomas King. It is not clear how many members there were as the Proceedings of the Society list Museum and Research Committee members together (some 25 persons in total). Perhaps this indicates that the Museum Committee was a sub-group of the Research Committee.

Though the Journal of the Society testifies to continuing activity in the years between 1876 and 1901 in increasing the number of species recorded in the Clyde Area, the three years preceding 1901 saw unprecedented recording activity, orchestrated by the Research Committee now convened by the Rev. G.A. Frank Knight, who himself was an active recorder of land and fresh-water molluscs, and produced the list of Mollusca and Brachiopoda for the Handbook. Other notable naturalists taking part were the entomologists Robert Henderson, whose Diptera collection survives at Kelvingrove Museum and at the University of Glasgow, Anderson Fergusson whose Coleoptera collection likewise survives, J. Russell Malloch and James J.F.X. King. The botanists included G.F. Scott Elliott and William Stewart, and John R. Lee, who was to produce a successor to Hennedy’s *Clydesdale Flora* and had just begun his work. Hugh Boyd Watt was the mammal recorder.

The 1901 Handbook is a much more substantial volume than its predecessor of 1876. The editors point out that, though the lists are longer than in 1876, and there are more taxonomic groups covered, the study of some groups had only begun in the preceding three years, and there were still groups missing from the lists.

Notable additions to the groups covered are: fish, several insect groups including crane-flies and dragon-flies, millipedes, spiders, freshwater algae, and microscopic fungi. The study of fungi in general was stimulated by a visit of the Cryptogamic Society of Scotland to Glasgow in 1880. The level of interest was sustained by the fact that its President Thomas King was also a member, and later, President of the Natural History Society.

CLYDE FAUNA CATALOGUE.

Orchestes

salicis L.

Locality	Date	Recorder			Remarks
A. Shewanston	20.V.16	A.F.		Coll. A.F.	On Willows.
R. Howdon	4.VI.23	T.H. Gordon		Coll. T.H.G.	
L. Tory Glen		W.M.	Glasg. Nat. IV, 81	Coll. W.M.	
Possil	2.VI.10	A.F.	20	Coll. A.F.	
S. Powardunnan	28.IX.21	A.F.		Coll. A.F.	
W.P. Aberfoyle	3.VII.20	A.F.		Coll. A.F.	
M.A. Lochgoilhead	IX.1915	A.F.		Coll. A.F.	
D.					
CI.					
C.					

Fig. 1 Clyde Card for the weevil *Orchestes salicis*

CLYDE FLORA CATALOGUE.

Lepidozia

pinnata Dum.

Distribution (Vice-Counties).	
72	86b
	86c
73	87
74	98 <i>Kilman (Scott)</i>
75 <i>West Kilbride (Ewing)</i>	99
76	100 <i>Arran (G.V. II. 41)</i>
77	101 <i>Ardrishaig (Ewing)</i>
83	Order. <i>Cephaloziaaceae</i>
84	Notes. (Habitat, Frequency, etc.) <i>Rupestrial. Rare.</i>
86a	

Fig. 2 Clyde Card for the liverwort *Lepidozia reptans*.

Apart from the lists themselves there are several accounts: G.F. Scott Elliot reviews the Botany of the area, and F.O. Bower gives an account of the History of Botany in Glasgow.

John Renwick and Richard McKay give an account entitled *Measurements of Notable Trees*, an enthusiasm shared by our current President. There is also a curious chapter entitled *Anthropology of the Clyde Valley* by Ebenezer Duncan which concerns skull measurements (obtained from local hatters). These are compared with measurements obtained from London hatters, and Duncan predicts that the comparatively high incidence of 'broad-headed' and 'long-headed' skulls in the West of Scotland will become less marked as a result of 'the continual influx of recruits from all parts of Britain and Ireland'.

The Handbook also contains several geological accounts: of the geology of the area by John Horne, of the rocks and minerals, of the glaciation of the area, locations for carboniferous fossils, and lists of the various fossils arranged in taxonomic groups.

1928: THE CLYDE CARDS ARE BORN

Professor Scott Elliott (1901) had expressed the hope that 'the lists would be kept up to date by specialists appointed for the purpose'. It is not clear for how long the Research Committee continued to exist. However, Andrew Barclay in his account *The Local Fauna* in the 1928 Handbook mentions that the 'anticipatory enthusiasm is inspiring, which is the more pronounced in contrast to the late apathy', an apathy which he dates from the onset of war and which 'continued throughout the peculiar subsequent period in civic history'.

Barclay describes how the idea of a card catalogue of the local Flora and Fauna had been under discussion for several years as 'an essential accessory to the modern methods in research work', but that none of the societies had 'ventured to put them into practical form'. The announcement of the forthcoming 1928 meeting of the British Association provided the required stimulus: a committee was set up comprising representatives of the University, Natural History Society, Andersonian Naturalists, Microscopical Society, Biological Section of the Royal Philosophical Society, Scottish Marine Biological Association, and several other local societies as well as individual naturalists under the presidency of Professor L.A.L. King. The group included many naturalists who had assisted with the 1901 catalogue.

The catalogue, on 5"x8" record cards, was 'creditably complete' by the time of publication of the 1928 Handbook. It appears to contain only additions to the lists since 1901, though some of the entries are references to published accounts which may well include earlier records. These

cards still exist and are located in the Natural History Department at Kelvingrove Museum in two small filing cabinets containing some 1600 cards (Flora) and 2,800 cards (Fauna) respectively. Each card holds information about one species, though many are blank except for the species name.

The layouts of the Fauna and Flora cards differ. Figure 1 shows the card for the weevil *Orchestes salicis* (now *Rhynchaenus salicis*): the first column gives the locations where this species has been observed – often only a single alphabetic character is shown: here it obviously signifies the vice-county. It can be seen that the earliest record of this species was by Fergusson at Possil in 1910, and this highlights the fact that some momentum was maintained in the years after the 1901 meeting. Figure 2 shows the card for the liverwort *Lepidozia reptans*: the locations are classified by vice-county; frequently only a reference to a journal or an individual is cited.

The 1928 Handbook comprises 'a collection of articles upon various aspects of Glasgow and its neighbourhood'. Andrew Barclay's review *The Local Fauna* has already been mentioned: he describes how, by this time, the grey squirrel was beginning to oust the red; in spite of the ever-increasing size of the city, there was no apparent loss of ornithological diversity, except perhaps the feared extinction of the hen-harrier; extensions to the lists of insects had been made, notably the Diptera with R. Henderson, J.J.F.X King, J.R. Malloch (veterans of the 1901 lists) and P.E. Grimshaw all making notable contributions - and progress had also been made on other invertebrate groups; and lastly, a technique recently developed in Glasgow for cultivating protozoa (particularly *Amoeba proteus*) for use in education, had had the two-fold result of discovering a new species of *Amoeba*, and exporting the 'Glasgow amoeba' to laboratories across the world.

In the 1928 review *The Local Flora*, Donald Patton, at that time President of the Society, says that the 1901 account 'is still an excellent guide to the Clyde area' and confines himself to general description of the types of habitat to be found there, though he mentions some of the more interesting species. He also states that 'every spring the naturalists of Glasgow arrange an excursion, the main purpose of which is to see the purple saxifrage in bloom. To this end, they make for one or other of the mountains around and to the north of the upper reaches of Loch Lomond'; this gentle habit has clearly been lost in the intervening years. J.R. Lee and D.A. Boyd, veterans of the 1901 lists, were among the conveners of the various botanical sub-sections.

THE LATER HISTORY OF THE CLYDE CARDS

Further information about the Clyde Cards is scanty. The Clyde Card Catalogue Committee had its own bank account from 1932 (when the

signatories were W. Cousin and L.A.L King) until 1957 (signatories Elsie Conway and R.H. Johnstone). The cards themselves, however, show no activity from about 1936, though there was a period of updating by the curators of Natural History at Kelvingrove Museum in the late 1980s and early 1990s.

The closing of the bank account in 1957 is puzzling in view of a remark by Mackechnie (1958); referring to a BSBI project for producing distribution maps of the flowering plants and ferns of the British Isles on a 10km square basis he adds: "When that scheme is completed it is anticipated that the energies of our local recorders of all forms of plant and animal life will be diverted to assembling the records for the new Clyde Card Catalogue". This period also saw the formation of the Nature Conservation Committee and the focus was more on individual sites ("Sites of Special Scientific Interest") than on the species lists for the wider area.

The latest reference to the Committee so far found is in Ribbons (1961), however, it is not clear from the context whether this refers to a Committee which was still active at that date. Enquiries have been made of current members of the Society who were members at that time, but no evidence of further activity has come to light. Undoubtedly, the second period of war and post-war depression would also have had its effect; however, it is regrettable that the 1958 BAAS meeting – in the era of 'you never had it so good' - did not have the same galvanising effect as the 1928 Meeting had.

Up until the 1980s, the Clyde Cards were kept in the Zoology Building of the University of Glasgow. When the room where they were kept was demolished during some building work, they may well have perished had not Geoff Hancock, then Curator of Invertebrate Zoology at Kelvingrove, saved them by taking them to that Museum.

A MODERN PERSPECTIVE

The Clyde Area

From the point of view of a local or national Biological Record Centre in the opening years of the 21st century, both the Clyde Area as an example of the 'natural division' method of dividing up the country, together with the vice-county system, must be seen primarily as an administrative convenience. It is useful for the botanical (for example) vice-county recorder for Renfrew to know where his area ends and the vice-county of Lanark begins. Similarly it is helpful for a local organisation such as the Glasgow Natural History Society (GNHS), whose professed area of interest is traditionally 'The Clyde Area' to know where the boundaries of that area lie – although the Society has apparently never felt bound by those limits in its excursion programmes over the years.

From a national perspective, the vice-county system, designed to divide the country into approximately equal areas, can give useful information about how widespread a species is, and an approximate atlas of its distribution – though information based on 10km grid-references serves those purposes even better, and is hardly more difficult for the individual recorder to generate. On the other hand, the Clyde Area has an undoubted geographical identity, and can meaningfully be said to 'contain' its Flora and Fauna, in a more obvious sense than a vice-county does.

However, the need now is to produce distribution maps or lists of species or species groups, and to produce lists of species for identifiable localities such as Sites of Special Scientific Interest (SSSIs), nature reserves, lochs, woodlands and parks. The concern to preserve and enhance biodiversity – that is, to increase the diversity of species in a particular area, and to manage habitats to promote the survival of species seen to be under threat – also demands more precise recording, not only of location, but also of numbers of species and evidence of breeding. It is important also to record habitats and how they change over the years.

In this context, the locations of field records need to be more precisely recorded, preferably as an Ordnance Survey grid reference with an accuracy of better than 1km. This requirement is assisted by the ready availability of global positioning systems (GPS) which use satellite transmissions to locate the position of the observer – which may however be, necessarily, not exactly the same as the location of the species being recorded.

It has been mentioned that historical records are valuable in that they indicate species which perhaps have been under-recorded in later years, as well as species which are now extinct in the locality for whatever reason – and those reasons may be worth investigating. However, there seems to be little intrinsic usefulness in publishing vice-county lists per se (for example). This view arises from the oft-encountered published reference to a species with no clue as to its locality except the vice-county; the record cannot be shown on a distribution map - even a 10km square grid-reference would be preferable in this respect. And of course, it is difficult to verify such a vague record, particularly in later years when the original observer is no longer alive, and his detailed records perhaps lost – in these circumstances the modern naturalist echoes the lament of James Stirton quoted above.

As with all scientific accounts, the requirement seems to be to provide as much information as possible. Keeping voucher specimens in a collection or herbarium is a long-established way of verifying the species identification; recording the location in sufficient

detail is equally important if the continued presence of the species is to be confirmed in later years. There may, of course, be good reasons why the location of some species should not be publicised; for example, to protect an endangered species, or because of the wishes of a landowner. This requirement can be implemented very easily in a computer-based system where sensitive records can be withheld from all but specially authorised users, yet the information remains available for posterity.

A modern biological database

Though many naturalists still maintain card-indexes, the computer is rapidly becoming the favoured data repository. The proposed National Biodiversity Network is a plan to link the databases of all local Biological Record centres through the Internet. Members of Glasgow Natural History Society have been active over the last three or four years entering records for the Greater Glasgow area into a desktop computer at Kelvingrove Museum, and though much of the work has been voluntary, some has been funded by Glasgow City Council on the grounds that the data that pertains to Glasgow is fundamental to the City's Biodiversity Action Plan, and the speed and convenience of computerised access to that data is a necessary part of implementing that plan.

This database now holds some 115,000 records including data taken from the various local Floras – by Hopkirk, Henney, Lee and *The Changing Flora of Glasgow* (though the latter information is at present easily accessible only in summary form) – also from the *Glasgow Naturalist*, the Clyde Bird Reports, the Butterfly Conservation database, and of course it includes a number of records from the Clyde Lists of the 1876 and 1901 Handbooks and the Clyde Cards.

Though there are known to be further records at Kelvingrove Museum, and in the possession of members of the Society and others, which could extend the number of species recorded in the database, the existing complement gives a reasonable indication of the coverage, particularly for the City of Glasgow itself. The discussion of this list which follows will, it is hoped, provide an interesting comparison with the situation at the time of the BAAS meetings.

The Appendix shows a summary by taxonomic group of the species which have been observed at locations within the present boundary of the City of Glasgow. Some of the groups are orders, some are classes and some families etc., according to common practice in each area of taxonomy. The first numeric column shows the number of UK species in the group, the second column is the number of species which have been recorded in Glasgow since 1950, the third, the number of species which have not been recorded since before 1950, and the fourth column is the sum of columns 2 and 3 – that is, the total number of species in that group which have been recorded in Glasgow.

A number of caveats are necessary. Firstly, some of the figures shown in the UK species column are based on incomplete lists - the database does not yet hold the complete UK list for that group; and, of course, many of the species that are included would not be expected either in Scotland or in the habitats which exist in the Glasgow area. The main omissions are in the lower plants (with the exception of the larger fungi), the more primitive animals (eg *Amoeba proteus*), and many invertebrate groups (even some of the major insect groups are incomplete). Particularly notable is the group *Monera*, the kingdom of bacteria, which yet has only two entries - cyanobacteria and filamentous bacteria - reflecting the fact that the bacteria have generally been ignored by the field naturalist, even though they form an integral part of the ecosystem of the species of interest. However, the numbers do give some indication of the diversity of each of the other groups, and therefore an indication of whether more species may well be found there. Note also that some of the entries in the description column indicate the names of the species found in the Glasgow area, rather than being a description of the group in general.

Secondly, both the pre- and post-1950 totals include species which were 'casuals' – single occurrences that did not persist. Examples include a hoopoe that visited the Fairfield shipyard for a few days in 1923 (another was seen in 1996 elsewhere in Glasgow), plants such as the culinary lentil and the grape-vine found on a coup, and exotic long-horn beetles that occasionally arrive here in cargoes of timber.

Several of the pre-1950 species are known to be extinct. But many are undoubtedly still present, and examination of the table shows which groups are likely to contain such under-recorded species that the present-day naturalists of Glasgow should perhaps make an effort to try to find again. Unfortunately, the list of over 2,600 species is too long to include in this account.

The table omits groups for which the database contains no records for Glasgow. Many of these are groups of marine organisms, but others may again indicate under-recording.

The higher-plant list is undoubtedly substantially complete, thanks to *The Changing Flora of Glasgow*. Among the lower plants, the larger fungi, as ever, show the most complete coverage, though the records come, in the main, from a few city parks and much of the other urban greenspace and woodland of Glasgow is unrepresented – the current need is not only to show that they exist within this arbitrary boundary, but also how widespread they are. The unicellular plants and slime moulds are apparently completely neglected; and the algae and mosses are probably under-represented.

In the animal kingdom, the bird, fish, mammal and butterfly lists are probably substantially complete, save for the lack of recent records of the smaller mammals. The number of butterfly species recorded is significantly increased compared with pre-1950; and recent moth records are known to exist, but are not included in the present totals. Coleoptera is the only other insect group which shows a greater number of records after 1950 than before that date – a testament to the efforts of the late Dr. Roy Crowson. The Diptera and Hymenoptera, both very actively recorded at the end of the 19th century, would certainly repay renewed activity now; and the figure shown for Diptera in the UK - 7850 - an example of a list which is known to be incomplete, are probably under-recorded. Perhaps there are more species to be found within other insect groups such as scorpionflies; and in the other invertebrate groups such as earthworms, spiders, amphipods, and isopods (woodlice). The flatworm, centipede and millipede lists may be substantially complete, but more information about their distribution would be desirable. There are current plans to carry out mollusc surveys – a significant number of species have not been recorded since 1950, and again, the records come mainly from a few sites. The protozoa and other lower animals are also apparently largely unsurveyed.

These remarks have arisen from consideration of the records for the Glasgow area, but perhaps they can be generalised to the wider area. Where there is a vice-county recorder for a taxonomic group, then the list for that group in that area will (usually) be substantially complete and up to date. For other groups, the coverage will be dependent on the interests of local naturalists, and visits by specialists from other parts of the country. However, it may well be more effective for local naturalists to collect specimens and send them to referees for identification.

Consideration of the distribution of species records also shows that there is a marked tendency for naturalists to visit the ‘interesting’ sites; that is, those that are species-rich or hold unusual species. Examples are Possil Marsh, Hogganfield and Bishop Lochs, Tollcross sandpits (in former days), and the banks of the Clyde at Carmyle and Kenmuir. Urban Glasgow tends to be neglected, except for the more obvious species such as vascular plants, birds and the larger insects (eg macro-Lepidoptera, Coleoptera, Odonata). There is an apparent shortage of records of fungi, most invertebrate groups, and - excepting a recent water-vole survey – the smaller mammals.

So the situation is in many ways similar to that 100 years ago. Many specialist naturalists are active in the West of Scotland, but though most taxonomic groups have been studied at one time or another over the past 150 years, the coverage of many groups of invertebrates and ‘lower’ plants has been sporadic. From time to time special

surveys have been implemented using visiting experts in fields that are not covered by local naturalists, and this is a useful way of filling gaps in our knowledge, though the number of locations that can be covered in such visits may be limited.

We can still usefully recommend today an ‘investigation into the Flora and Fauna of the West of Scotland and in particular those departments of Invertebrate Zoology and Cryptogamic Botany regarding which no local information has yet been provided’ – although we would now have to modify this objective slightly by appending the words ‘and those regarding which no information has been provided within the last 50 or more years’.

Andrew Barclay, in the 1928 Handbook, expressed the hope that the information in the Clyde Card Catalogue would be published, and that ‘since the work is for the benefit of all naturalists, some public body will assist them in the publication, so that it may be made accessible to all’. It remains to be seen whether the advent of a National Biodiversity Network accessible through the Internet will finally realise this aspiration.

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Appendix: Fauna and Flora records for Glasgow

Group	Description	UK species	Since 1950	Before 1950	Total
Monera	prokaryotes	2			
Protosteliomycetes	primitive slime moulds	8			
Ceratiomyxomycetes	slime moulds	1			
Dictyosteliomycetes	cellular slime moulds	12			
Acrasiomycetes	amoeboid slime moulds	3			
Myxomycetes	slime moulds	405			
Deuteromycotina	fungi imperfecti	124			
Chytridiomycetes	uniflagellate fungi	2			
Oomycetes	biflagellate fungi	106			
Zygomycotina	zygomycete fungi	5			
Ascomycotina	ascomycete fungi (lichens)	8785	132	7	139
Russulales	basidiomycete (gill) fungi	6597	124	36	160
Gasteromycetes	basidiomycete (stomach) fungi	255	4		4
Teliomycetes	rusts	668	5		5
Chlorophyta	algae	93	3		3
Rhodophyta	red algae	2			
Xanthophyta	algae	1			
Bacillariophyta	diatoms	1			
Hepaticae	liverworts	581	34		34
Anthocerotae	hornworts	14			
Musci	mosses	1953	95	58	153
Lycopodiopsida	clubmosses & quillworts	31	1		1
Equisetopsida	horsetails	39	6	1	7
Pteridopsida	ferns	284	22	1	23
Ginkgoopsida	ginkgo	1			
Pinopsida	conifers	143	5		5
Magnoliidae	dicotyledons	7763	892	90	982
Liliidae	monocotyledons	2228	232	23	255
Myxospongida	sponges	3	1		1
Actiniaria	hydra	13	3		3
Tricladida	flatworms	29	8	1	9
Gordioidea	horsehair worms	5			
Enoplida	nemertean worms	2			
Phylactolaemata	moss animals	9	1		1
Mollusca	non-marine molluscs	304	45	32	77
Oligochaeta	oligochaetes	27	3		3
Lumbricina	earthworms	142	2		2
Acanthobdellida	leeches	1	1		1
Rhynchobdellida	leeches	12	6		6
Gnathobdellida	leeches	2	1		1
Pharyngobdellida	leeches	8	4		4
Diplopoda	millipedes	118	16		16
Chilopoda	centipedes	74	6	1	7

Collembola	springtails	2			
Protura	proturans	12			
Diplura	two-pronged bristle tails	12			
Thysanura	three-pronged bristle tails	14	1		1
Ephemeroptera	mayflies	77	3		3
Odonata	dragonflies	91	10		10
Plecoptera	stoneflies	73	9		9
Phasmida	stick and leaf insects	6			
Orthoptera	grasshoppers and crickets	47	1		1
Dermaptera	earwigs	8	1		1
Dictyoptera	cockroaches	14	3		3
Psocoptera	booklice	142	3	3	6
Phthiraptera	sucking lice	39			
Thysanoptera	thrips	158			
Hemiptera	bugs	1652	17	1	18
Neuroptera	lacewings	203	3		3
Coleoptera	beetles	8229	370	153	523
Strepsiptera	stylops	25	1		1
Mecoptera	scorpionflies	5			
Trichoptera	caddisflies	287	10		10
Lepidoptera	butterflies and moths	3154	130	3	133
Diptera	flies	7850	69	395	464
Siphonaptera	fleas	109	5	1	6
Hymenoptera	sawflies, bees, wasps, ants	5320	31	66	97
Anostraca	fairy shrimps	3			
Notostraca	tadpole shrimps	1	1		1
Cladocera	water fleas	100	14	5	19
Ostracoda	ostracods	184	1	3	4
Calanoidea	copepods	14		1	1
Cyclopoida	copepods	11	1	1	2
Branchiura	fish lice	3		1	1
Bathynellae	cave shrimps	2			
Mysidacea	opossum shrimps	2			
Isopoda	isopods	113	13	9	22
Amphipoda	amphipods	29	1		1
Pseudoscorpiones	false scorpions	88	3	2	5
Opiliones	harvestmen	78	2		2
Araneae	spiders	1628	12	15	27
Acari	mites	115	2		
Ixodida	ticks	31	2		
Heterotardigrada	tardigrades	4			
Eutardigrada	tardigrades	1			
Hyperoartia	lampreys	6	2		2
Lamniiformes	basking shark	1			
Chondrostei	sturgeon	1			
Isospondyli	salmonid fish	17	5		5
Haplomi	pike	1	1		1
Ostariophysii	minnow, loach, carp etc	20	6		6
Apodes	eel	1	1		1
Anacanthini	burbot	1			
Percomorphi	perch	16	2		2

Scleroparei	bullhead	2	1		1
Thoracostei	sticklebacks	3	2	1	3
Heterosomata	flounder	1	1		1
Urodela	newts and salamanders	6	2		2
Anura	frogs and toads	11	2		2
Chelonia	turtles and tortoises	9	1		1
Squamata	snakes and lizards	9			
Gaviiformes	diving birds	10	3		3
Podicipediformes	grebes	10	4	1	5
Procellariiformes	petrels	21	2		2
Pelecaniformes	gannet, shags, etc.	8	3		3
Ciconiiformes	storks	19	2	1	3
Phoenicopteriformes	flamingos	1			
Anseriformes	ducks and geese	110	35	1	36
Accipitriformes	buzzards	27	7	2	9
Falconiformes	raptors	11	3		3
Galliformes	pheasants, grouse, etc.	18	4	1	5
Gruiformes	rails & crakes	21	5		5
Charadriiformes	wading birds	196	44	6	50
Pteroclidiformes	sandgrouse	1		1	1
Columbiformes	pigeons and doves	10	6		6
Psittaciformes	parrots	4			
Cuculiformes	cuckoos	4	1		1
Strigiformes	owls	17	4	2	6
Caprimulgiformes	nightjars	4		1	1
Apodiformes	swifts	7	1		1
Coraciiformes	hoopoe	7	1		1
Piciformes	woodpeckers	15	3		3
Passeriformes	passerine birds	344	78	4	82
Insectivora	hedgehog, mole, shrews	8	5		5
Chiroptera	bats	33	4	1	5
Lagomorpha	rabbits and hares	5	2		2
Rodentia	rodents	24	7	3	10
Cetacea	whales and dolphins	25	2	1	3
Carnivora	carnivores	19	9	1	10
Pinnipedia	seals	8	1		1
Perissodactyla	odd-toed ungulates (horse)	1			
Artiodactyla	even-toed ungulates (deer)	15	1	1	2